Mapping Wetland Communities within the Missouri River Floodplain

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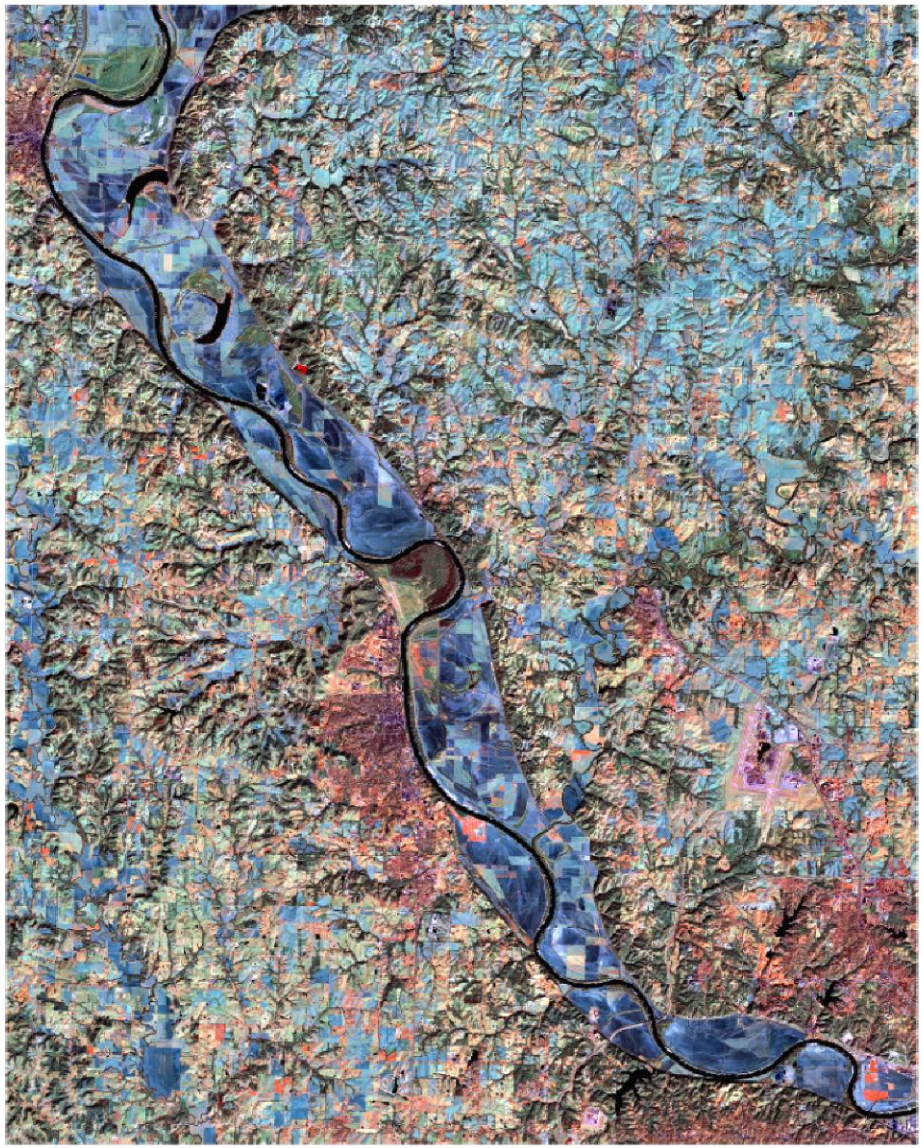
Objectives

- Increase the accuracy to which wetland areas can be identified using remotely sensed information

- Pilot the use of object oriented remote sensing techniques for the mapping of wetlands

Methods

- Use a variety of satellite based image products
- Collect remotely sensed information from multiple time periods
- Develop fine scale digital elevation models
- Multi-stage classification system implemented using object oriented approach



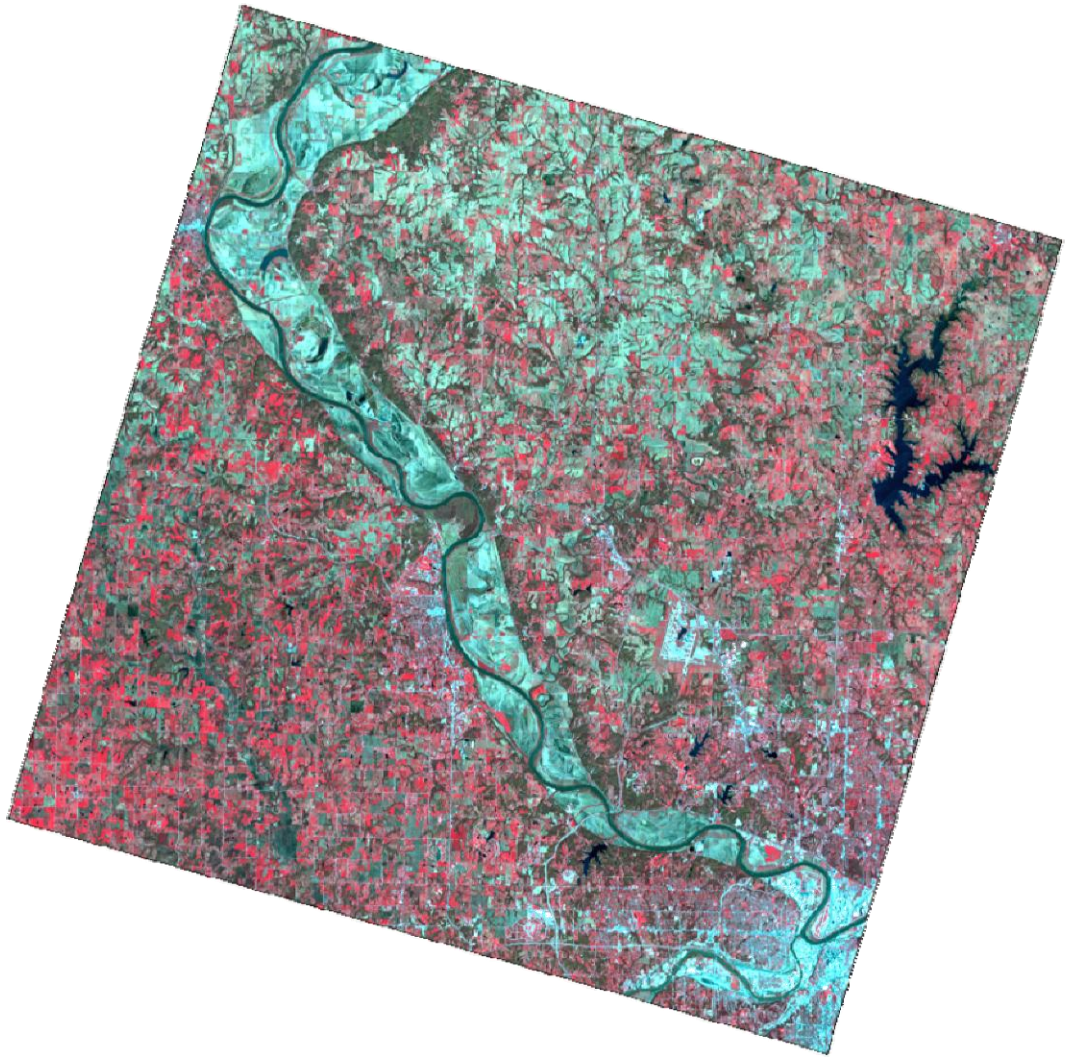
Landsat Thematic Mapper

Collected December 31, 2002

Panchromatic and Mutlispectral data merged and resampled to 10m spatial resolution

Coincided with low water reading from Missouri River stream gage

Analyzed to determine areas that are permanently flooded



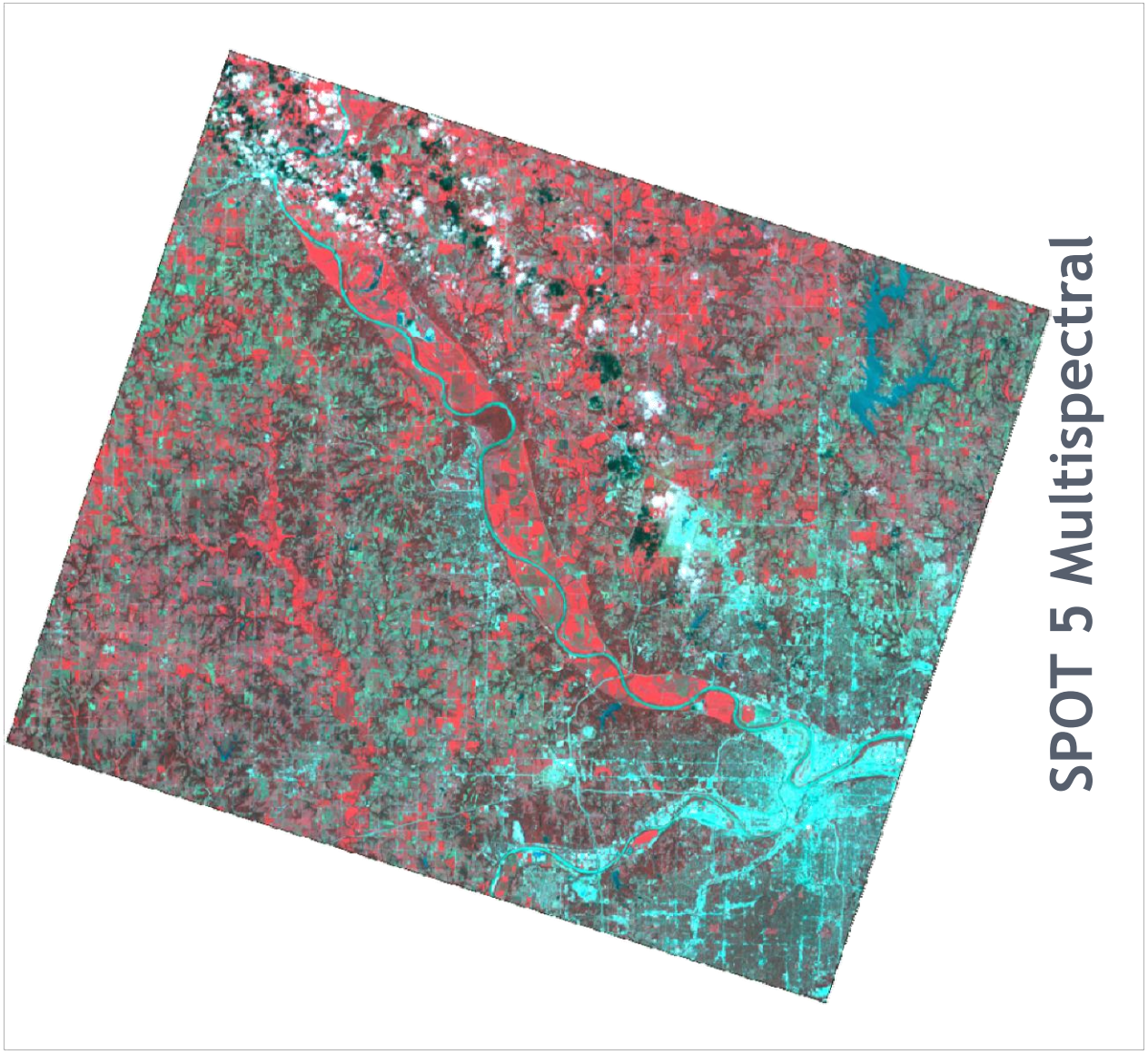
SPOT 5 Multispectral

Collected April 16, 2007

Native 10m Mutlispectral data

Desire was to capture the beginning of the growing season

Analyzed to determine system and class attributes of the wetland classification



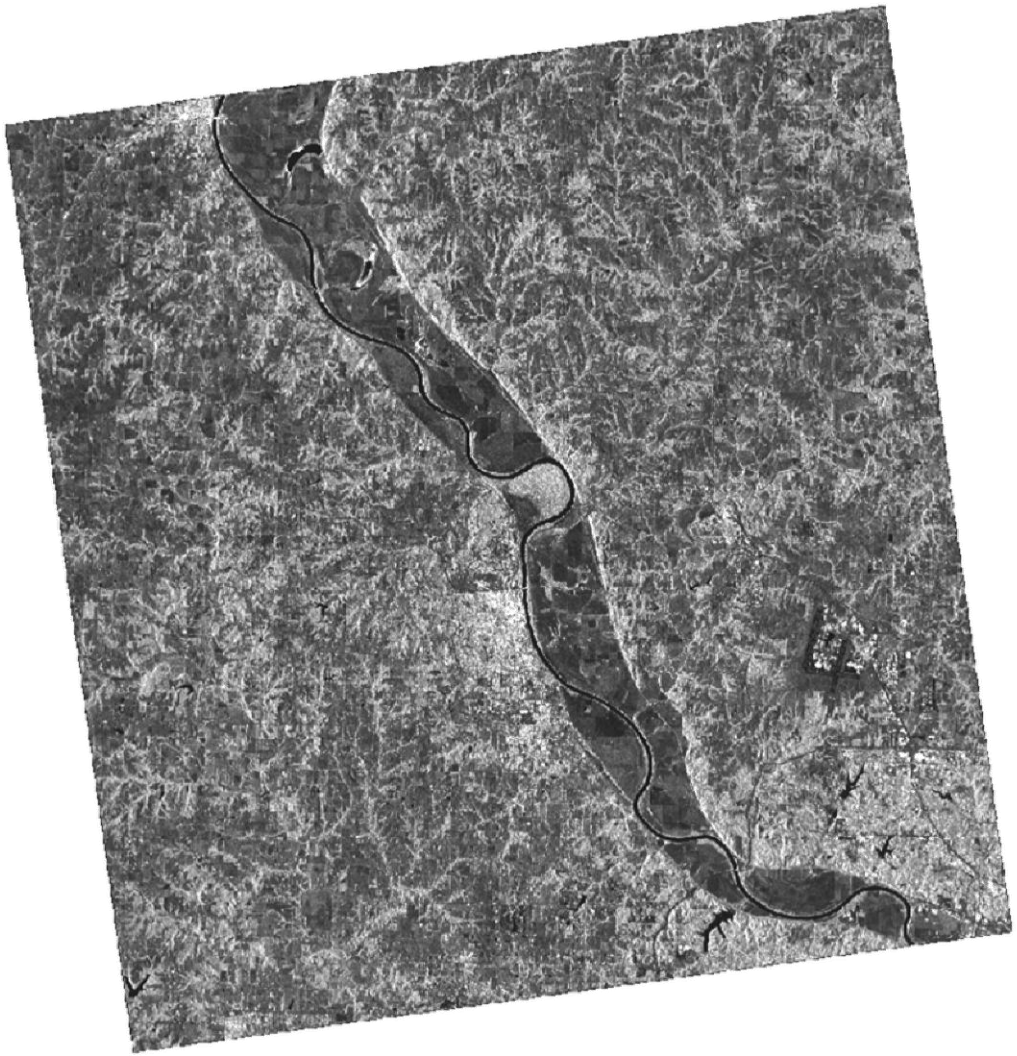
SPOT 5 Multispectral

Collected August 13, 2007

Native 10m Mutlispectral data

Desire was to capture the height of the growing season

Analyzed to determine system and class attributes of the wetland classification



Radarsat-1 Fine Beam

Collected April 20, 2007

Fine Beam 8m spatial resolution

Desire was to capture vegetation structure

Analyzed to determine system and class attributes of the wetland classification

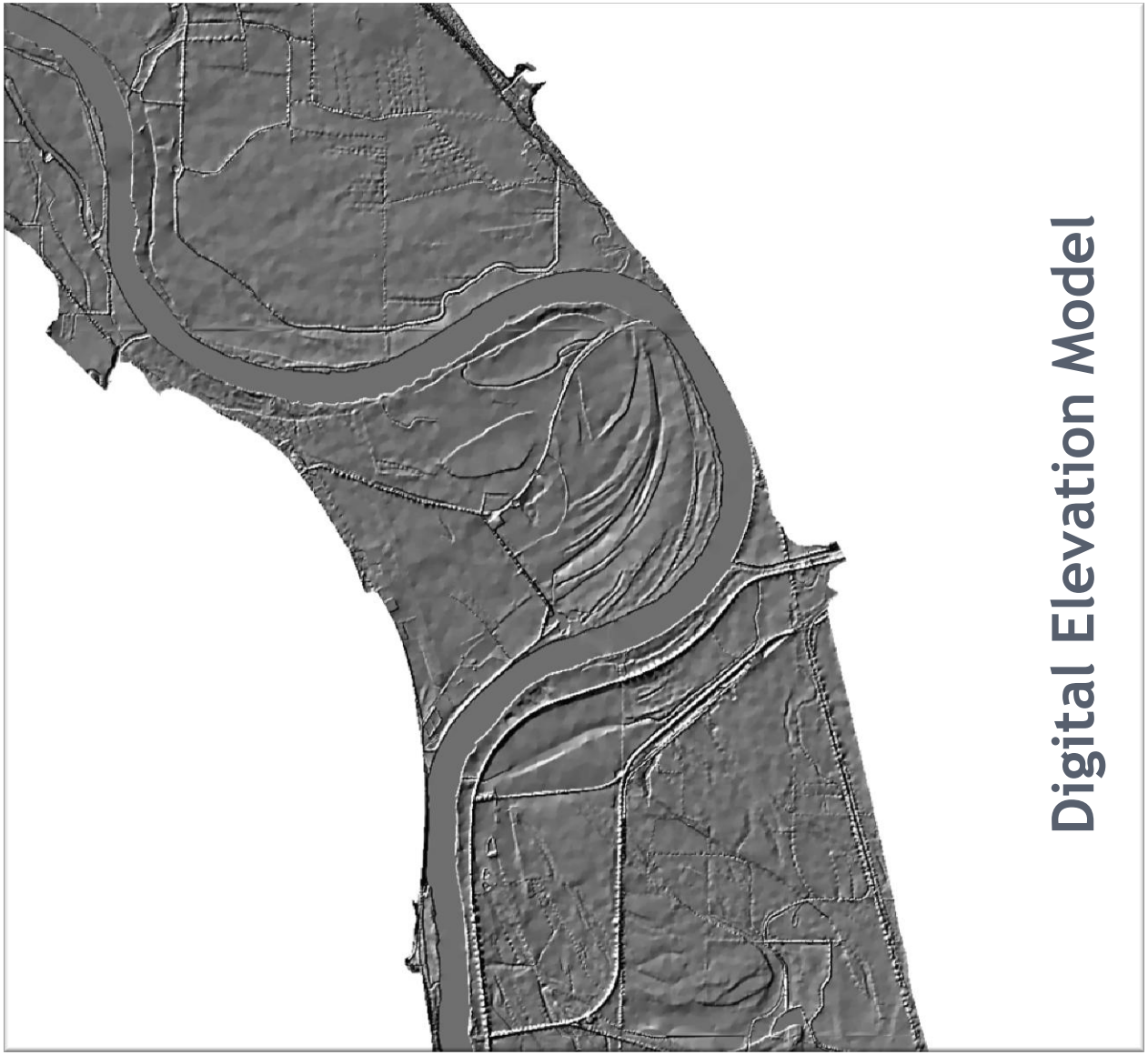
USACE Mass Points and Break Lines

Collected 1998 by Horizon, Inc. for USACE

Break lines and mass points collected

Over 1.2 million points

25 foot postings

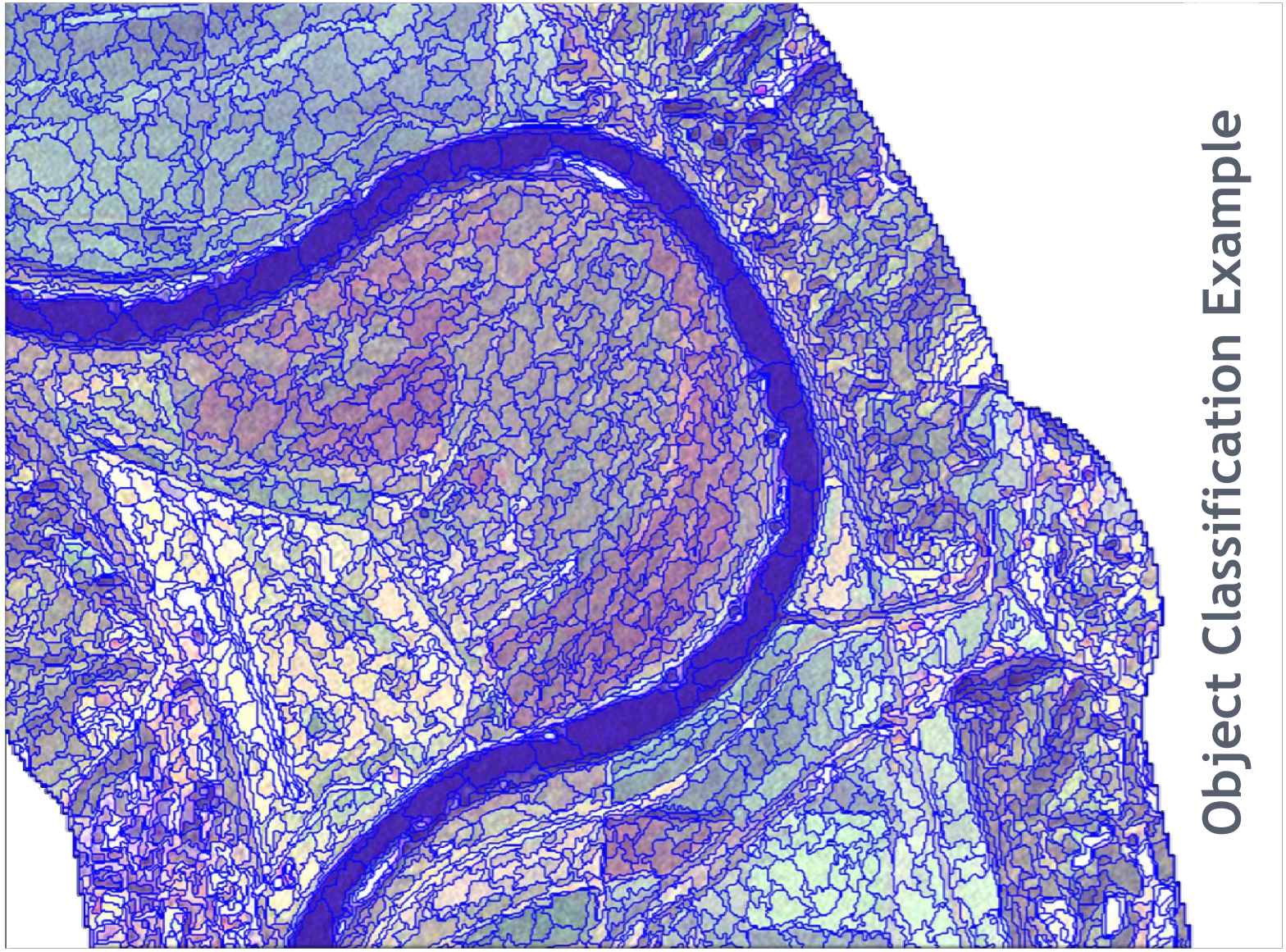


Digital Elevation Model

5m pixel size

Less than 1 foot vertical resolution

Object Classification Example

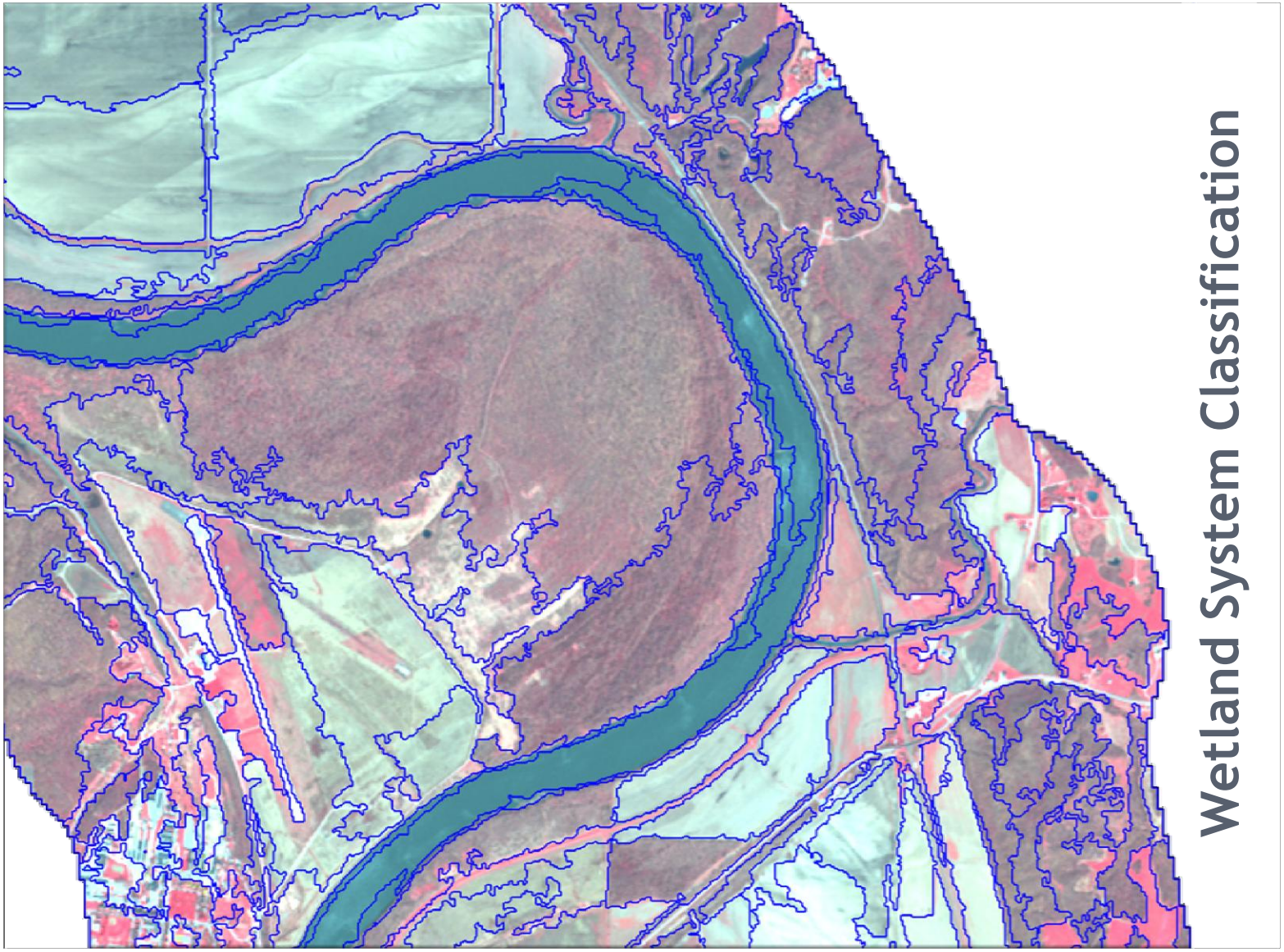


Generate objects

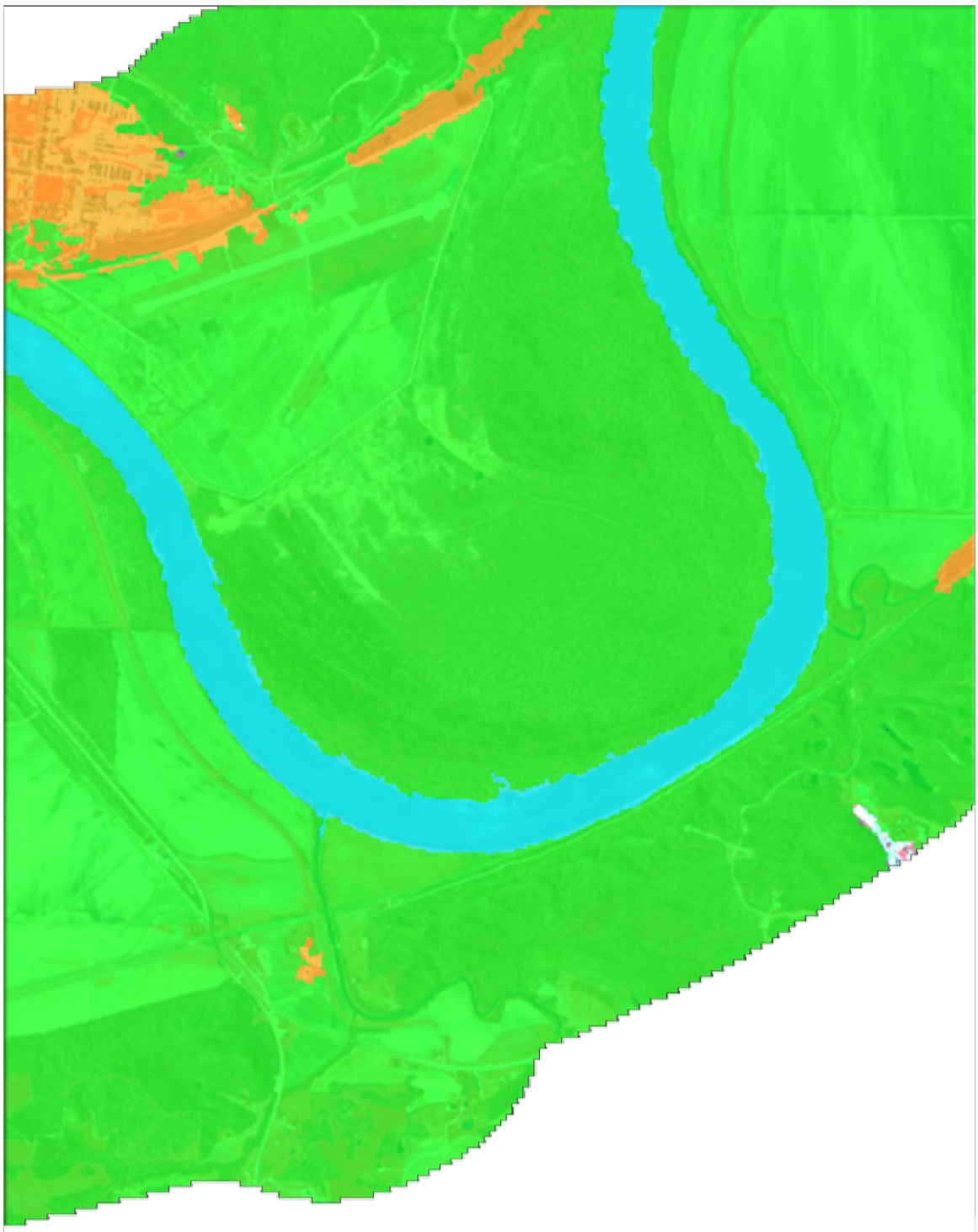
Multi-Stage Classification System

- Classification system consists of multiple stages
  - Wetland system classification
  - Wetland class classification
  - Water regime classification

- Incorporate above stage classifications to develop final classification

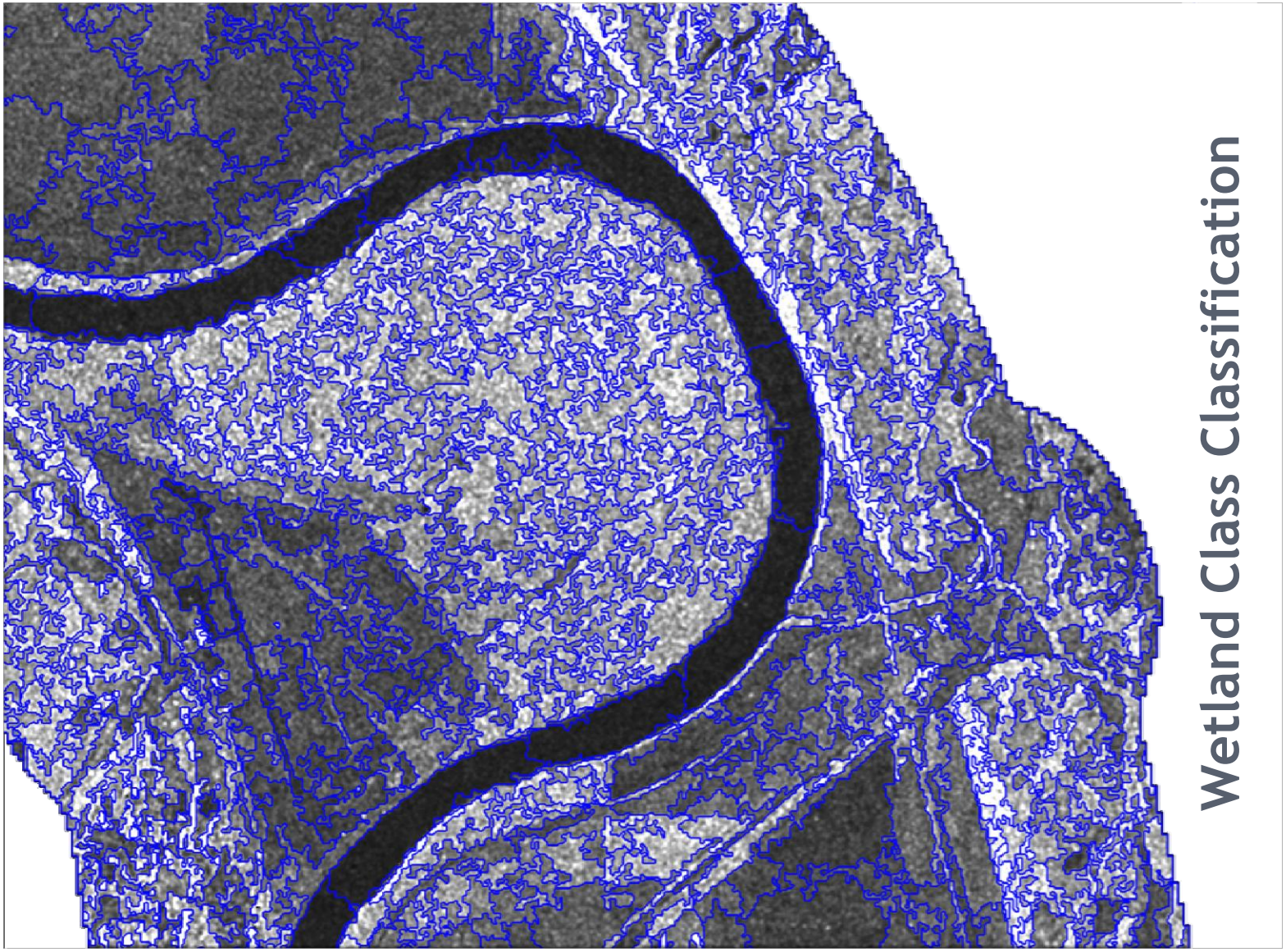


Object generation

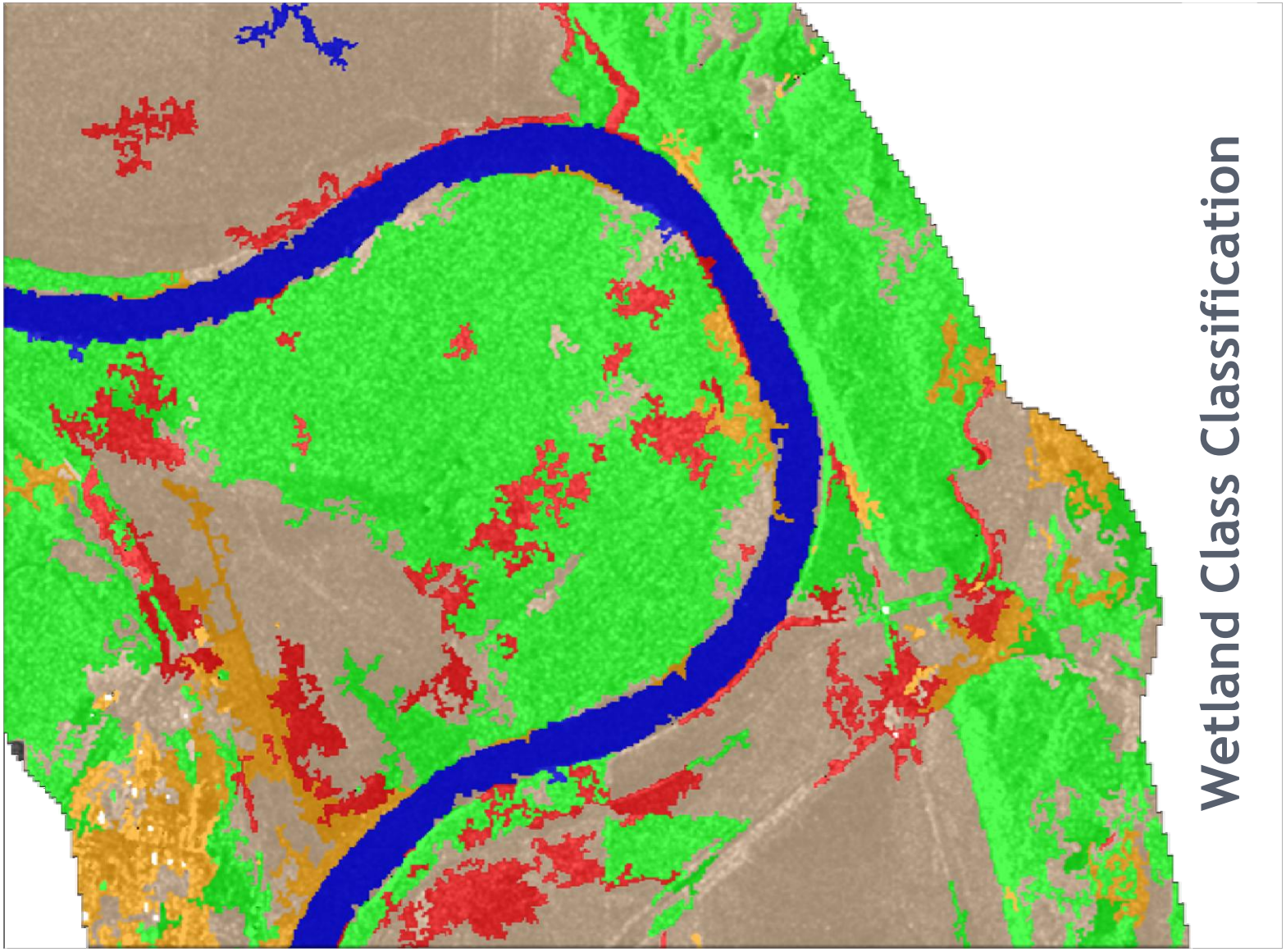


Wetland System Classification

Object classification



Object generation

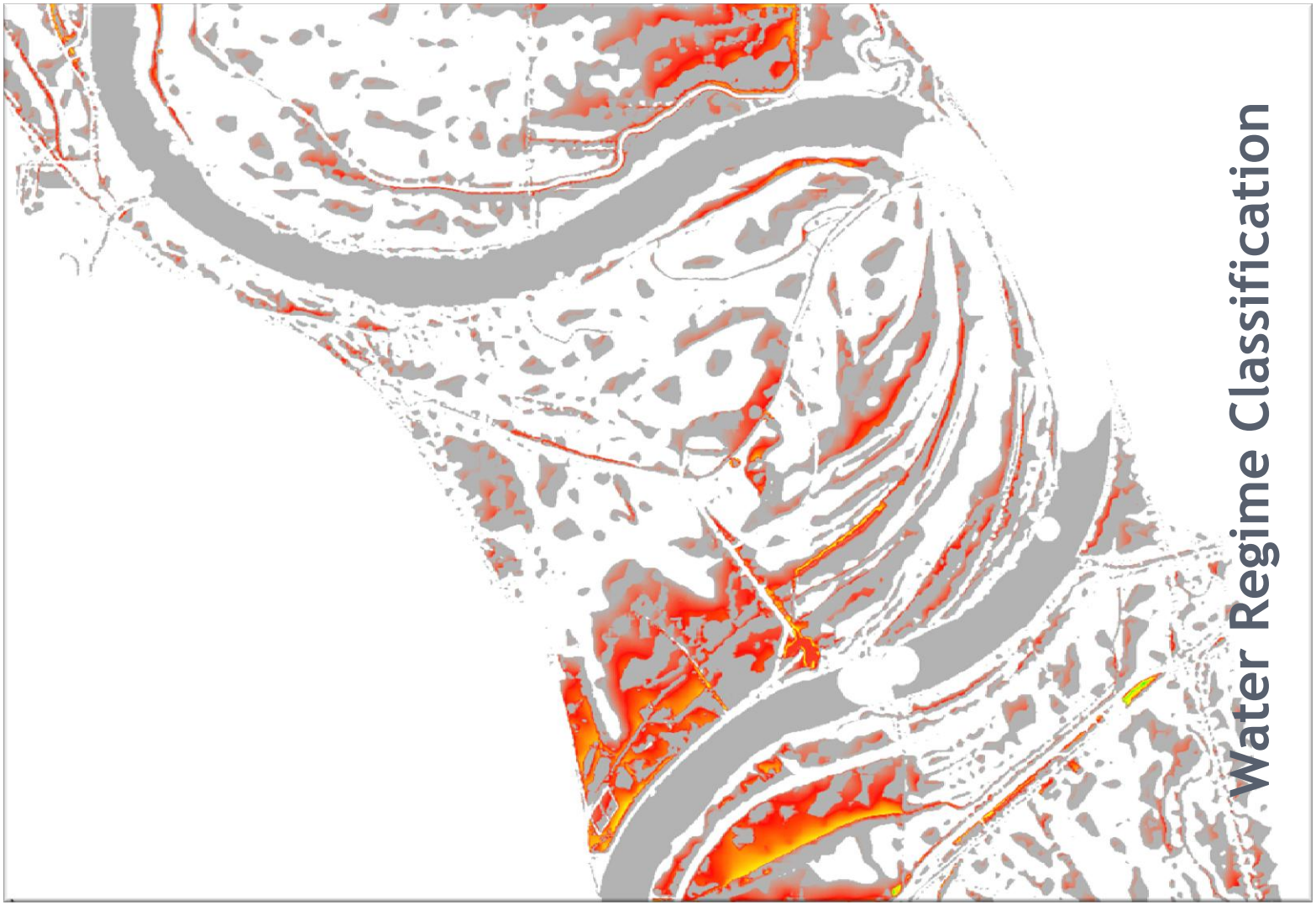


Object classification

Digital Elevation Model

Water Regime Classification

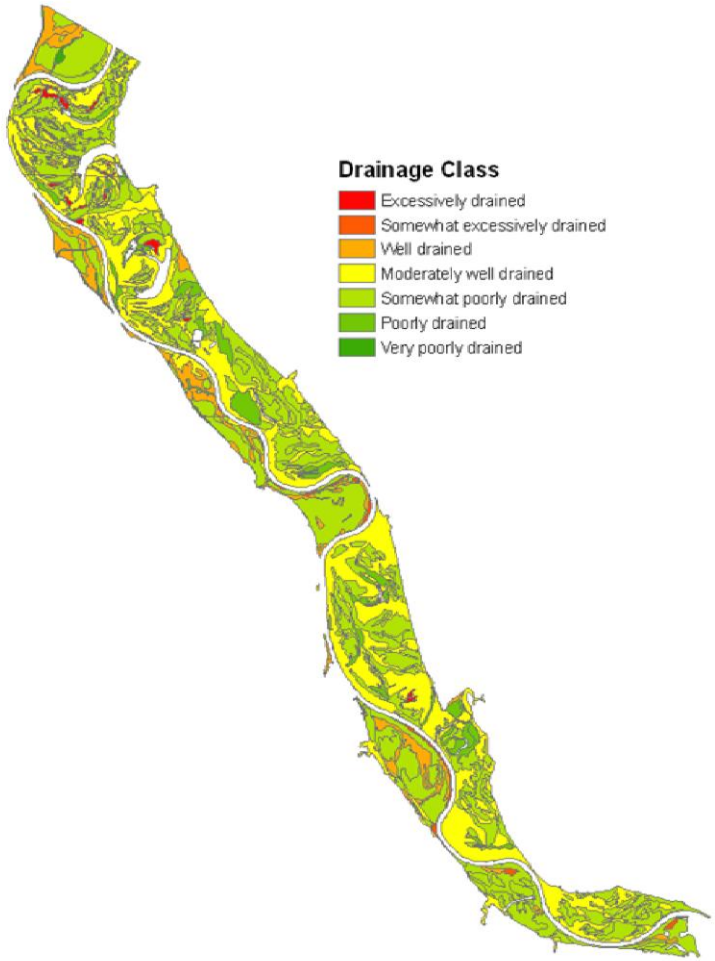
Filled Digital Elevation Model



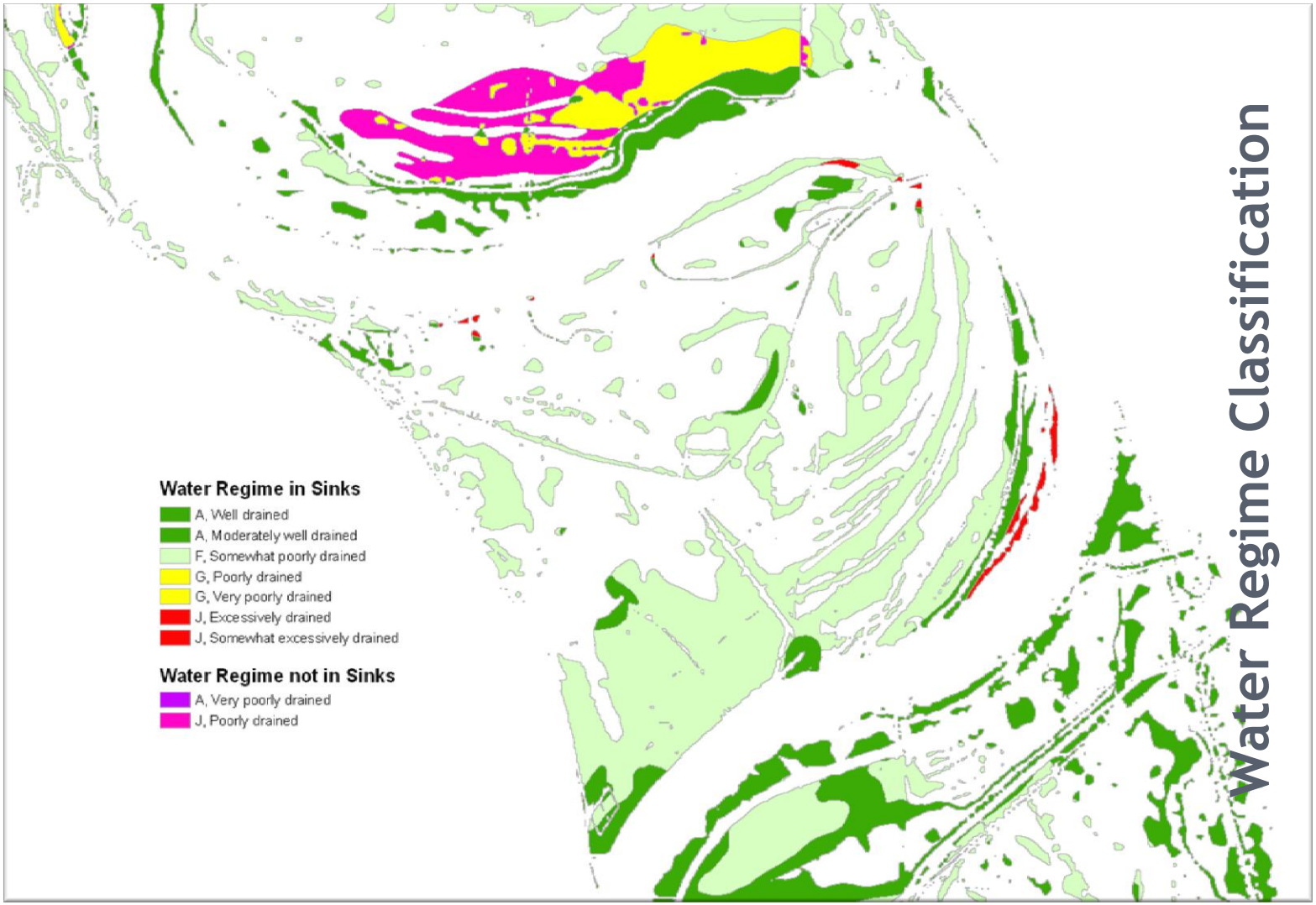
Filled Digital Elevation Model subtracted from Digital Elevation Model equals Sinks

We think of this as ponding potential

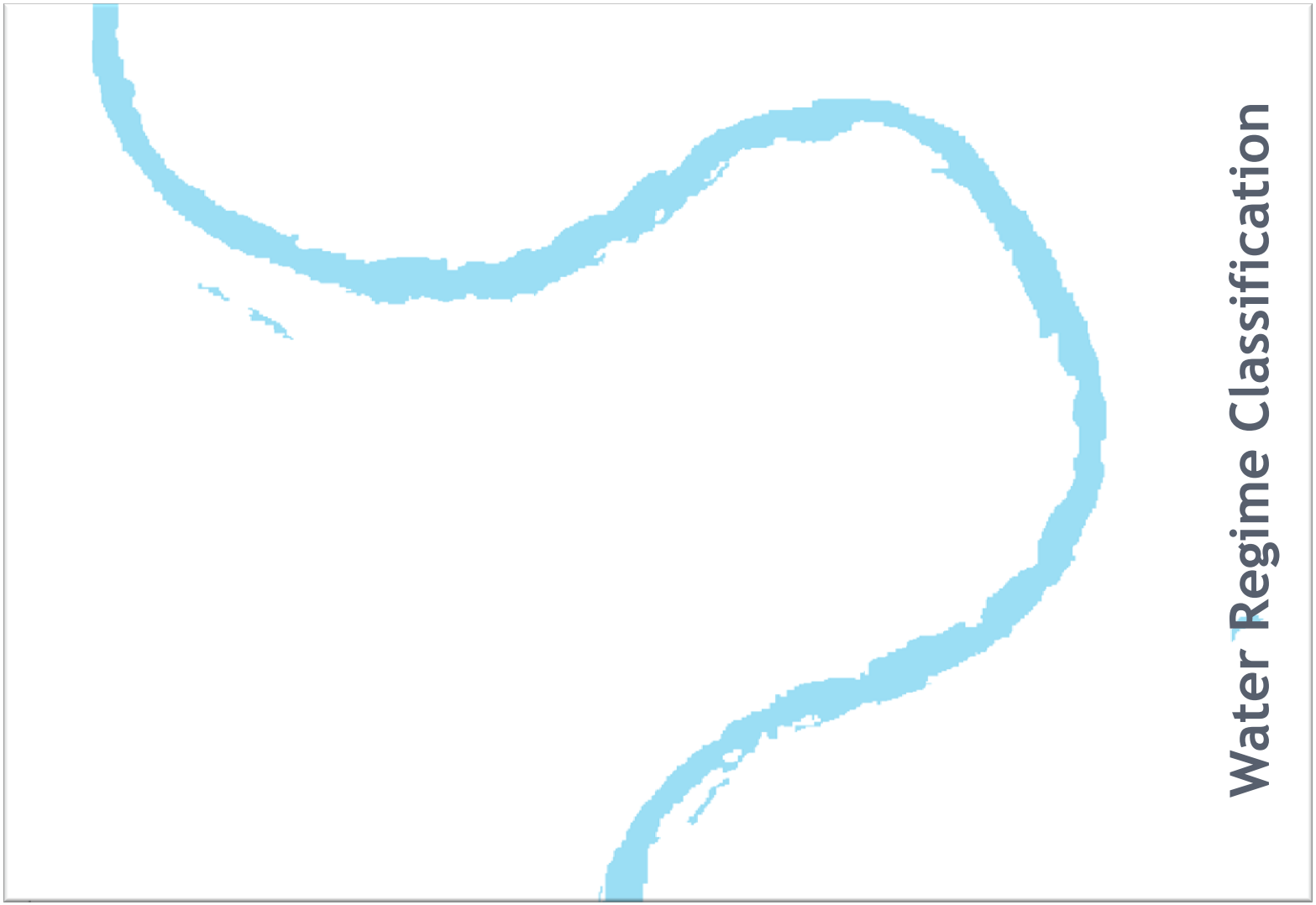
Water Regime Classification



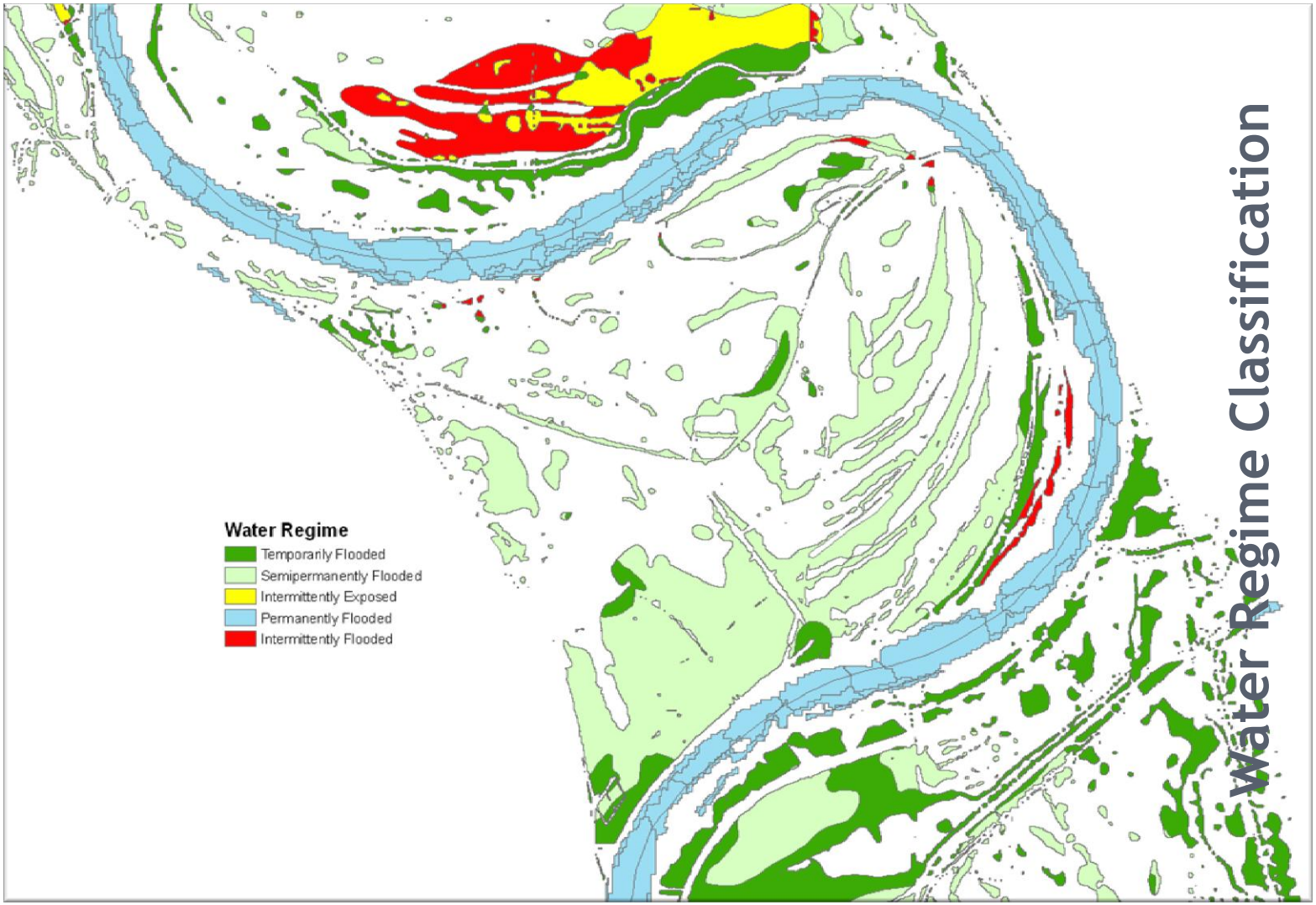
SSURGO
Drainage Class



Union of SSURGO drainage class and DEM developed sinks

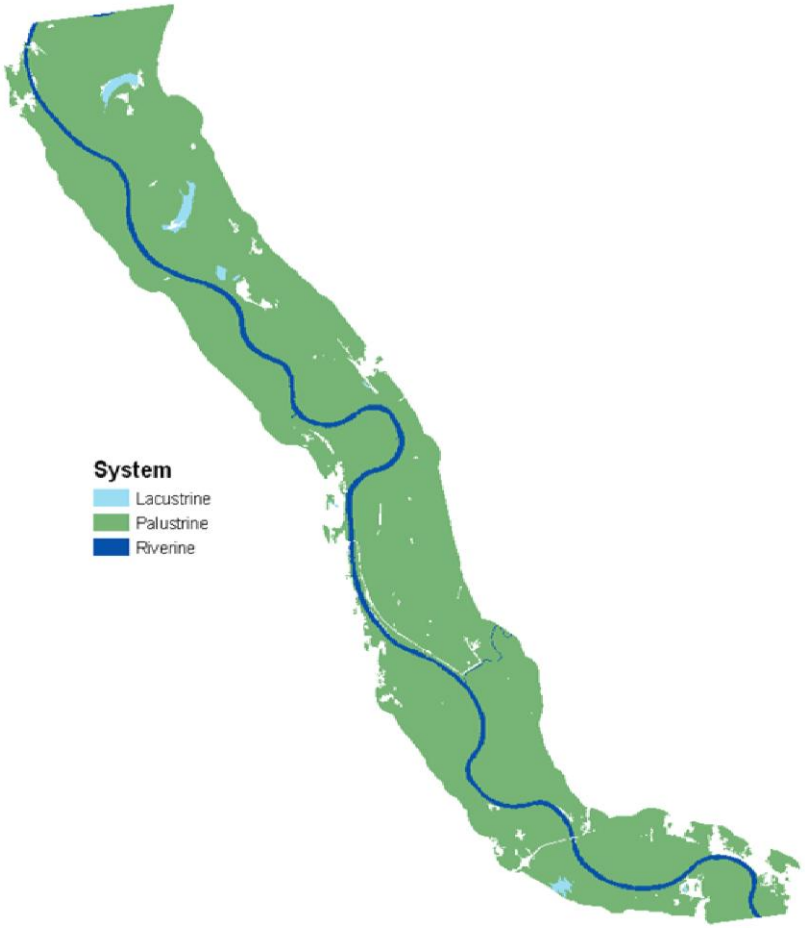


Permanently flooded developed through object classification



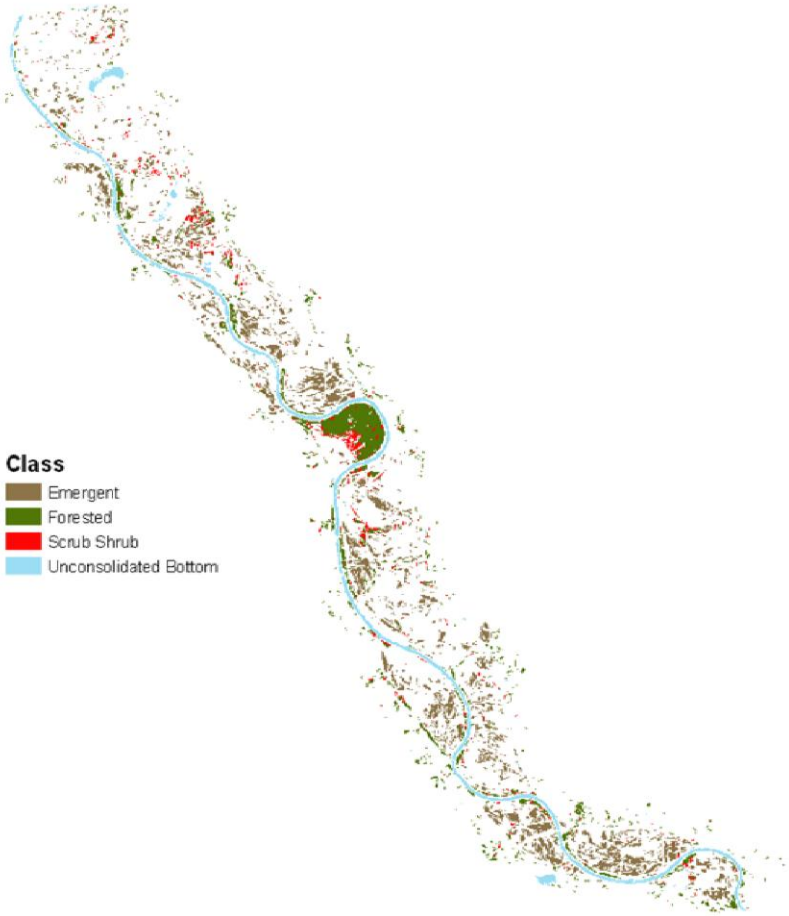
Water regime created by combining permanently flooded and SSURGO/DEM data

Wetland System Classification



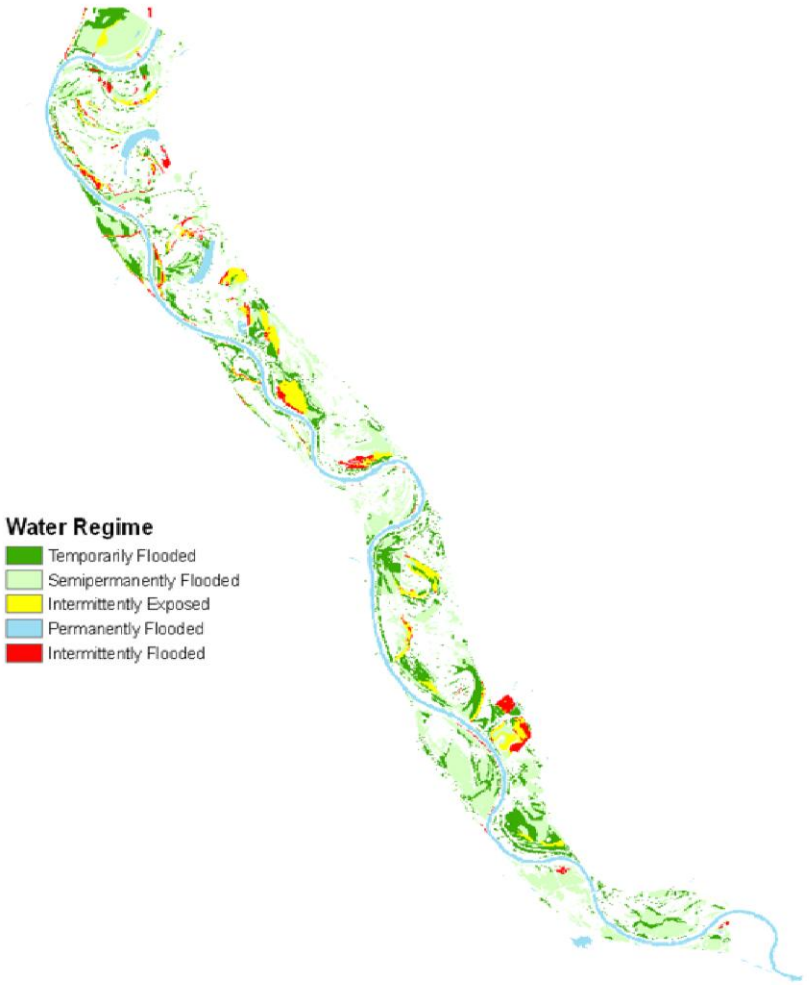
Final wetland system classification

Wetland Class Classification



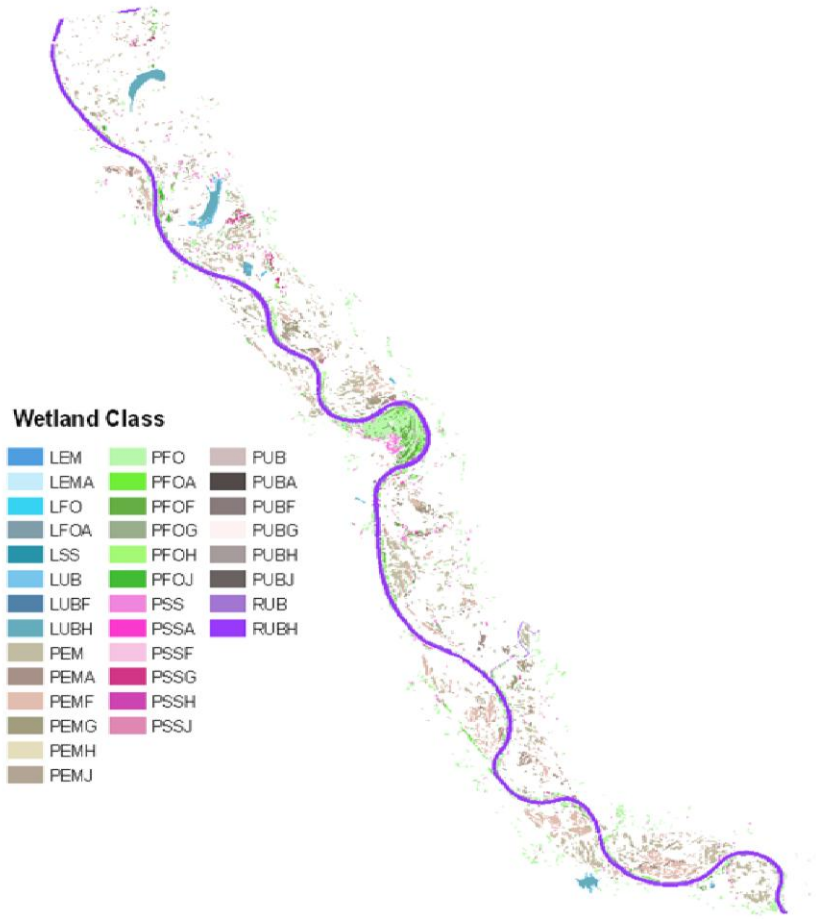
Final wetland class classification

Water Regime Classification



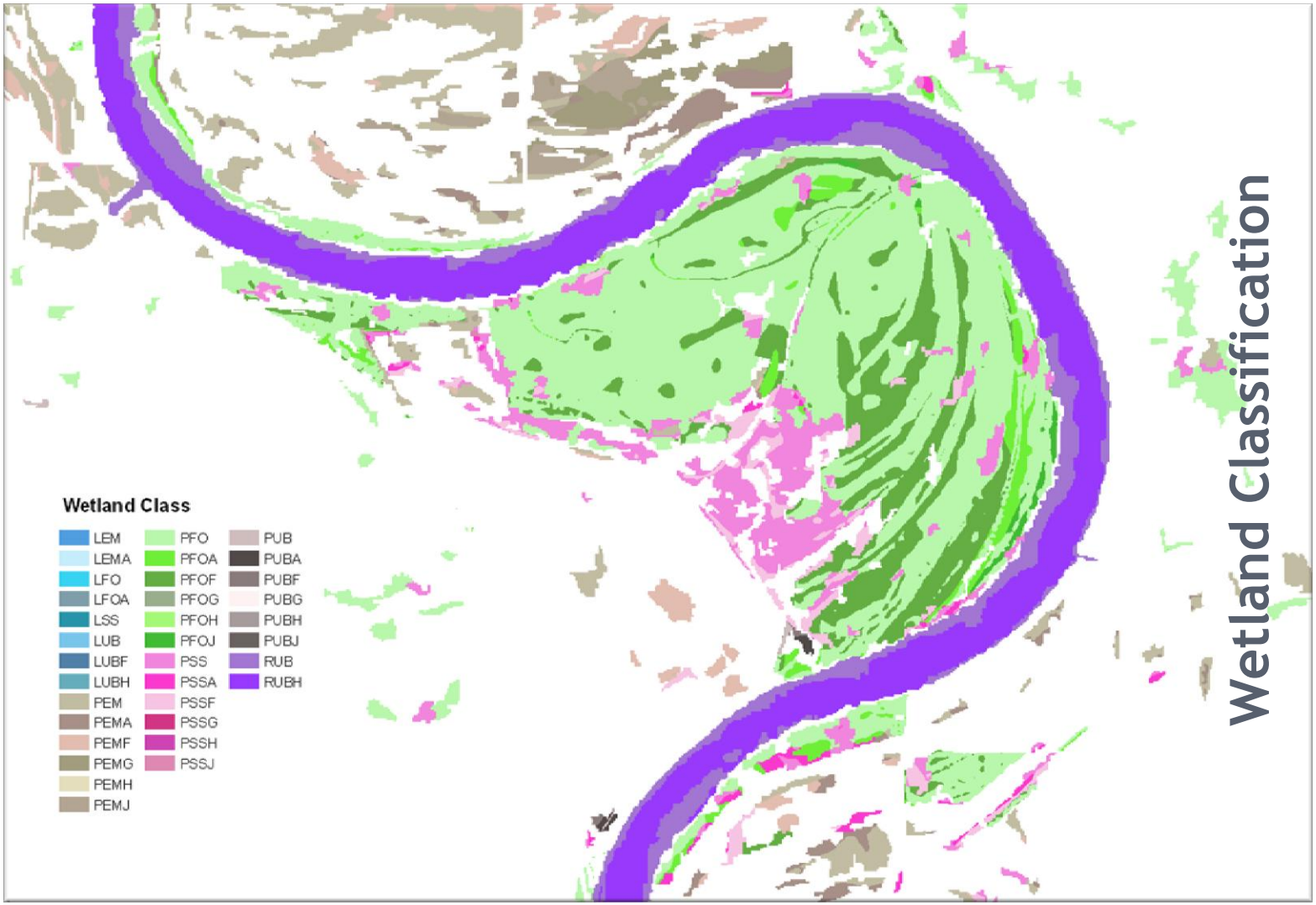
Final water regime classification

Wetland Classification



Concatenate all attribute fields to arrive at wetland codes

Wetland Classification



Conclusion

- Have demonstrated that wetland types can be mapped through object oriented classification of satellite acquired remotely sensed information

- Technique shows promise and has the capability to be applied to regional/national level mapping activities